

The satellite traverses its own diameter of 2,900 miles in about nine and a half minutes.

Taking into account the degradation of brightness towards the Sun's limb, we can hardly suppose that the Sun's light would be diminished so that the satellite would be lost sight of while a section of the Sun's disk with a versine of $1''.5$ remained visible at a point half-way between the centre of the satellite and the following limb—that is to say, four minutes before the geometrical eclipse of the last portion of the Sun's disk at the following limb of the satellite. But even with the tables at present in use the predicted times for central eclipses of the fourth satellite do not differ from the observed times by as much as four minutes. We may consequently be sure that the horizontal refraction in the atmosphere of *Jupiter* at the height where the last ray is transmitted does not amount to $4'$ of arc.

I would suggest that the spectrum of the light of the satellites should be examined as they disappear in the shadow of the planet, to see whether any evidence of absorption can be detected due to the long passage of the illuminating rays through the atmosphere of *Jupiter*.

Observations of U Monocerotis and LL 14551, with a new Photometer. By the Rev. T. E. Espin, B.A.

The following observations of *U Monocerotis* were made with a photometer and opera-glass. The photometer was attached to the 5-inch Refractor, and is of simple construction; a beam of light is cut off by a circular stop, and leaves a disk of light on a dark field. The beam of light is totally reflected by a prism to the eyepiece end from a small oil lamp, that can be turned up or down at pleasure. So long as the eyepiece is in focus the star will be seen on the bright and dark background alike; but by gradually drawing out the tube, the image of the star becomes a disk, which up to a certain point will be seen on the bright part of the field; but when the eye-piece is drawn out beyond that point, it will be invisible, being lost in the brightness. Obviously the brighter the star the further the tube must be drawn out to reach the point of disappearance. The method employed in determining the magnitude of a variable star is to measure one star whose magnitude is known, and is greater than the variable, and one whose magnitude is known and less than the variable.

The distance the tube is drawn out is read off by a scale from a mark on the telescope to some mark on the draw tube. The variable star is then measured. The magnitudes of the two comparison stars being known, the difference of readings will equal the difference of magnitudes, and it becomes a matter of simple proportion to find the magnitude of the variable star. The variable star *U Monoc.* was discovered by Dr. Gould, of

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Cordoba. The place in the *Uranometria Argentina* is (1875) R.A. $7^h 24^m 50^s$, Dec. $-9^\circ 31'0''$, and the period there is given as about 46 days. As far as I am aware there are no other published observations save those of the Cordoba Observatory. Though only two stars are necessary as comparison stars, four other stars have been measured occasionally to test the photometer, and do away with any errors arising from variation in the comparison stars.

The following are the places from the *Uranometria Argentina*:—

	R.A.	Decl.	Mag. Ur. Ar.	Mag. Photom.
	^{1875.} h m s	^{1875.} ° ' "		
(1) 5 Puppis	7 42 6	- 11 53.2	5.9	6.0 (assumed)
(2) LL 15283	7 44 10	- 8 52.2	6.2	6.19
(3) LL 14706	7 26 6	- 8 36.7	6.3	6.44
(4) LL 14599	7 23 26	- 10 4.2	6.2	6.52
(5) W.B. 664	7 22 38	- 9 47.4	7.0	7.0 (assumed)
(6) LL 14551	7 21 59	- 11 18.3	6.3	var. 6.09-6.77

Of these stars, No. 2 was measured on five nights; the difference between the extremes being 0.27. No. 3 was measured on eight nights; the difference between the extremes being 0.10. No. 4, a suspected variable, was measured on fourteen nights; the difference between extremes being 0.24. While No. 6 was measured on twenty-one nights, and estimated on five others. This star is undoubtedly variable between 6.09 and 6.77. The following are all the determinations of magnitude I have obtained:—

LL 14551, R.A. $7^h 21^m 59^s$, Dec. $11^\circ 18'3''$ S. (1875).

	d	h	Mag.	
1883, Feb.	14		6.30	Measured
	15		6.20	"
	23		6.19	6.09 Double set of measures.
Mar.	1		6.26	Measured.
	3		6.31	"
	11		6.0	Estimated; clouds troublesome.
	12		6.51	Measured.
	13		6.67	"
	14			Brighter.
	15		6.53	Measured.
	17	9	6.35	"
	18	$8\frac{1}{2}$	6.42	"

	d	h	Mag.	
1883, Mar.	23	9 $\frac{3}{4}$	6.54	6.59 Double set of measures.
	26	9 $\frac{1}{2}$	6.54	6.47 "
	30	8 $\frac{1}{2}$	6.42	6.46 "
	31	9	6.55	6.54 "
Apr.	1	8 $\frac{1}{2}$	6.30	Measured.
	3	8 $\frac{1}{2}$	6.58	6.52 Double set of measures.
	6	9	6.64	Measured.
	7	8 $\frac{1}{2}$	6.64	Estimated.
	8	8 $\frac{1}{2}$	6.46	Estimated; misty.
	11	8 $\frac{1}{2}$	6.57	Estimated.
	12	9 $\frac{1}{4}$	6.50	Measured.
	16	9	6.77	"
	20	9	6.65	"
	22	8 $\frac{3}{4}$	6.55	Or less estimated.

The variation is undoubted, but the period seems to be irregular, or the observations not sufficient to determine it. This star is P. vii. 116 and Σ 1097. The magnitude of the bright companion being given by Σ as 6.5, but by Heis as 6. The first measures of *U Monocerotis* were made with the photometer on Feb. 14. Observations previous to this were made by estimations with an opera-glass. Occasionally two sets of measures were made, each measure being repeated three times.

U Monoc., R.A. 7^h 24^m 50^s, Dec. 9° 31' 0" (1875).

Date.	Mag.		Date.	h	Mag.	
1883.			d			
Jan. 15	6.65	Estimated.	Feb. 22		6.78	Measured.
	18	6.60	"	23	6.45	"
	19	6.55	"	Mar. 1	6.22	"
	26	6.10	"	2	6.20	Estimated.
	27	6.00	"	3	6.19	"
	30	6.10	"	4	6.19 ⁽¹⁾ 6.19 ⁽²⁾	"
Feb. 5	6.40	"	11		6.10	"
	10	6.80	"	12	6.40	Measured.
	12	6.65	"	13	6.57	"
	13	6.50	"	14	6.50	Estimated.
	14	6.40	Measured.	15	6.49	Measured.
	15	6.72	"	17	6.33	"
	18	6.77	"	18	6.53	"
	20	6.79	"	23	9 $\frac{3}{4}$ 6.84 ⁽¹⁾ 6.84 ⁽²⁾	"

Date.				Mag.				Date.				Mag.			
		d	h							d	h				
Mar.	26	9½	6.70	6.65	Measured.			Apr.	7	8½	7.00	Estimated.			
	30	8½	6.92	6.91	"				8	8½	7.20	"			
	31	9	6.94	6.98	"				11	8½	7.05	"			
Apr.	1	8½	7.18		"				12	9¼	6.85	"			
	3	8½	7.00	7.05	"				16	9	6.73	Measured.			
	6	9	7.21		"				20	9	6.65	"			
									22	8¾	6.50	Estimated.			

From these we obtain as times of maxima—

1883, Jan. 28	6.00 ±	1883, Mar. 7 ±	6.00
Feb. 14	6.40	Mar. 17	6.33

And for times of minima—

1883, Feb. 10	6.80	1883, Mar. 13	6.57
20	6.79	Apr. 6	7.21

At the minimum, March 31–April 11, there were small but well-marked fluctuations in light. The star did not seem hazy during this time, nor was there any perceptible change in the colour, which is yellowish-red. The total number of nights between the first and last observation is ninety-seven, and observations were obtained on forty-one.

West Kirby, Birkenhead :
1883, June 3.